

## 4 Flow Augmentation Scenarios

This chapter describes the flow augmentation scenarios analyzed by Reclamation. These scenarios are:

- Base Case: Provide 427,000 acre-feet of flow augmentation water each year (existing condition since 1993).
- No Augmentation: Provide no water for flow augmentation (condition prior to 1991).
- 1427i: Provide up to 1,427,000 acre-feet of flow augmentation water to meet deficits in flow targets at Lower Granite Dam. Irrigation shortages would be minimized by using large drawdowns of Reclamation reservoirs.
- 1427r: Provide up to 1,427,000 acre-feet of flow augmentation water to meet deficits in flow targets at Lower Granite Dam. Reservoir elevations would be maintained at or near the Base Case levels with shortages assumed by irrigation.

The Base Case is the standard against which other scenarios are compared to identify effects. The No Augmentation and the 1427 scenarios were requested by the Corps. Reclamation chose to analyze two 1427 scenarios and to pick a specific acreage of private land to retire from irrigated agriculture to provide a volume of water for flow augmentation. The remaining volume of water for flow augmentation would be obtained from Reclamation reservoirs. The two 1427 scenarios represent points near each end of a continuum of possible ways of providing large amounts of water from Reclamation reservoirs. The 1427i scenario represents one way of minimizing the effects on the lands irrigated from Reclamation reservoirs with negative effects on reservoir resources. The 1427r scenario is the reverse, emphasizing minimal effects on reservoir resources with adverse effects on irrigated lands.

These scenarios are conceptual to provide only general information. Development of the 1427 scenarios beyond the programmatic level presented in this analysis would also include comprehensive public involvement and site specific analysis.

### 4.1 Base Case Scenario

#### 4.1.1 Description

The Base Case scenario represents the status quo against which the other scenarios are compared to determine effects. In 1991, Reclamation began a program of providing water for flow augmentation to aid downstream migration of endangered salmon in the lower Snake River. Reclamation committed to the current operation in Reclamation's 1995 ROD which was in response to NMFS 1995 BIOP. A key provision of the NMFS 1995 BIOP, and repeated in Reclamation's ROD, is that water purchases for flow augmentation must be made on a willing seller/willing buyer basis. The current target volume of 427,000 acre-feet has been provided each year since 1993; post augmentation accounting indicates that the volumes vary slightly from year to year but are as near to the 427,000 acre-feet target as operating practices allow.

Water for the current flow augmentation is obtained from the purchase of natural flow rights, reassignment and reacquisition of space in Reclamation reservoirs, and annual purchase of water through the Idaho Waterbank. IPC cooperates in this endeavor by helping shape flows at Brownlee Dam.

#### 4.1.1.1 Historic Water Deliveries

Table 4-1 summarizes the sources and amounts of water delivered for flow augmentation from 1991 through 1998. Volumes in this table through 1997 are post augmentation accounting.

<b>Table 4-1</b> Reclamation's Water Delivery for Flow Augmentation (Acre-Feet)								
Source	1991	1992	1993	1994	1995	1996	1997	1998
<b>UPPER SNAKE RIVER</b>								
Reclamation space	15,000		206,617	285,954	22,396	22,396	22,396	22,896
American Falls					8,951	8,951	8,951	8,951
Jackson					3,923	3,923	3,923	3,923
Palisades			13,615	15,754	9,522	9,522	9,522	10,022
Palisades powerhead			18,794	153,530				
Minidoka powerhead			95,575	99,240				
Ririe			78,633	17,430				
Rentals	84,000	0	65,000	44,325	232,839	194,667	202,104	200,325
Subtotal	99,000	0	271,617	330,279	255,235	217,563	224,500	223,221
<b>PAYETTE RIVER</b>								
Reclamation space	28,874	90,000	95,000	61,883	94,242	95,000	95,000	95,000
Cascade			69,600	26,845	68,842	69,600	69,600	69,600
Deadwood			25,400	35,038	25,400	25,400	25,400	25,400
Rentals	73,651		34,971		50,758	56,300	60,000	50,000
Subtotal	102,525	90,000	129,971	61,883	145,000	151,300	155,000	145,000
<b>BOISE RIVER</b>								
Reclamation space			23,000	35,950	25,000	38,000	38,000	40,932
Anderson Ranch					3,000	3,000	3,000	
Anderson Ranch powerhead			20,000	10,950				
Lucky Peak			3,000	25,000	22,000	35,000	35,000	40,932
Rentals					2,000		2,000	
Subtotal	0	0	23,000	35,950	27,000	38,000	40,000	40,932
<b>OREGON NATURAL FLOWS</b>								
Skyline Farms						15,714	17,649	17,649
Oregon Water Trust						64	132	198
Subtotal	0	0	0	0	0	15,778	17,781	17,847
Grand Total	201,525	90,000	424,588	428,112	427,235	422,141	437,281	427,000

#### 4.1.1.2 Permanently Acquired Water Sources

To date, Reclamation has reacquired 60,274 acre-feet of contracted storage space in Reclamation reservoirs and acquired 17,650 acre-feet from natural flow rights. Water that accumulates in reacquired storage space is transferred through a rental pool for use downstream under current Idaho law. The natural flow rights acquired to date were in Oregon where State water law permits the acquisition of natural flow water rights for instream use. At the time of closing that acquisition, the OWRD approved a change of use from irrigation to instream flow for the acquired water rights. All acquisitions have been made under the willing seller/willing buyer concept in which voluntary participation of both parties is essential.

Reclamation first determines the amount of natural flows and uncontracted storage space available each year before releasing reacquired storage space for flow augmentation. This method of operations reduces the probability of irrigation shortages in subsequent years. Table 4-2 summarizes reacquired contracted storage space and natural flow water rights

<b>Table 4-2</b> Permanent Reclamation Acquisitions for Flow Augmentation		
Entity	Acquisition Date	Right Acquired
Storage Space		
Salmon River Canal Company	December 1994	Repayment contract entitlement: 6,518 acre-feet in American Falls Reservoir
Canyon View Irrigation Company	August 1995	Repayment contract entitlement: 15,878 acre-feet in American Falls, Jackson, and Palisades Reservoirs
Palisades Water Users, Inc.	July 1998	Repayment contract entitlement: 500 acre-feet in Palisades Reservoir
Nampa and Meridian Irrigation District	July 1996	Water service contract entitlement: 35,000 acre-feet in Lucky Peak Lake
J.R. Simplot/Micron Corp.	January 1998	Water service contract entitlement: 2,378 acre-feet in Lucky Peak Lake
Total space		60,274 acre-feet of storage space
Natural Flow Right		
Skyline Farms	February 1997	17,650 acre-feet of natural flow rights

#### 4.1.1.3 Reassigned Active Space and Inactive Space

A total of 98,554 acre-feet of uncontracted active storage space (95,000 acre-feet in Cascade Reservoir and 3,554 acre-feet in Lucky Peak Lake) has been reassigned to flow augmentation. This is released for flow augmentation in accordance with the provisions of I.C. 42-1763B. Water that accumulates in the reassigned active storage space is generally available every year. This source provides water as long as the ESA-listed anadromous fish runs require flow augmentation.

In the drought years of 1993 and 1994, Reclamation was unable to meet the commitment for 427,000 acre-feet without using water in the inactive storage space of Reclamation reservoirs. As a last resort, Reclamation released water held in previously never-used powerhead space in Palisades Reservoir, Lake Walcott (Minidoka), and Anderson Ranch Reservoir. Powerhead space is that part of the inactive

capacity of a reservoir intended to provide a hydraulic head for the proper operation of hydroelectric generators. Without this hydraulic head, adverse flow conditions can develop in the system, requiring the generator units to be shut down. Reduced powerhead space resulted in some decrease in power production but did not affect the entitlements of contract spaceholders. Water in powerhead space is released in accordance with I.C. 42-1763B.

#### **4.1.1.4 Rental Pools**

Annual purchases of water placed in Idaho rental pools have helped Reclamation provide flow augmentation since 1991. The relative abundance and short term availability of this water supply makes the rental pool a priority source for flow augmentation water. After quantifying the amount of water available from natural flows and uncontracted reservoir space, Reclamation attempts to purchase the remaining water from rental pools to make up the 427,000 acre-feet. Reclamation makes requests for rental water through the watermaster of each rental pool. Reclamation, to date, has based its distribution of purchases among the three Idaho rental pools on the basis of availability of water and the cost of rentals.

Providing 427,000 acre-feet of water for flow augmentation each year is a continuous effort. Rental pools will be a significant source of water for the 427,000 acre-feet for the foreseeable future, and improving the reliability of rental pool supplies for flow augmentation is desirable. Strengthening existing rental markets and developing new ones appears to be an approach that can be supported by varied interests.

#### **4.1.1.5 Delivery Plan**

Flow augmentation water is usually requested in the lower Snake River during the downstream migration in July and August when Lower Granite Dam targets are not being met. This period generally coincides with the recession of natural flows and the draft of storage for irrigation. Storage releases for irrigation generally begin by early July, but may begin as early as April or May in a low water year. The strategy for release of the 427,000 acre-feet of flow augmentation water depends on the magnitude and timing of natural runoff at Milner, Lucky Peak, and Cascade Dams. Under current agreements, some augmentation water is released during periods when the target flows at Lower Granite Dam are already being met.

Each year, Reclamation provides a plan to the Technical Management Team (TMT) in mid-April. The TMT makes recommendations to Reclamation and the Corps on implementing delivery of water flow augmentation water. Reclamation monitors streamflow and reservoir conditions above Brownlee Dam and begins delivery in accordance with the augmentation plan and recommendations of the TMT. The deliveries essentially become inflow to Brownlee Reservoir and may be stored there for the TMT's scheduled release based on weekly requests to IPC. The TMT monitors delivery activities by posting information on the TMT web site.

TMT salmon managers have occasionally made system operation requests that varied from the annual plan of release. Reclamation accommodates these requests when it can and responds in writing when the requests cannot be accommodated.

#### **4.1.1.5.1 Upper Snake River Releases**

Reclamation typically begins flow augmentation releases from upper Snake River sources at the time irrigations storage releases begin, normally in June or early July. These releases are regulated to maintain a flow of 1,500 cfs past Milner Dam. This “feathering in” of flow augmentation releases is done in consideration of ESA-listed aquatic snails in downstream reaches. The release rate of 1,500 cfs also extends the period of time that augmentation water can provide instream benefits for water quality and resident fish and wildlife. It is also in accordance with an agreement with IPC. If augmentation releases begin late in the season, some of the upper Snake River releases will not reach the lower Snake River by the end of the salmon migration season in August. The Reclamation-IPC agreement provides for the delivery of all releases below Brownlee during the augmentation season. In return for limiting the delivery rate to 1,500 cfs, the IPC has agreed to predeliver from Brownlee Reservoir the portion of the augmentation release that arrives at Brownlee Reservoir after August 31.

Near the end of the seasonal flow augmentation release, Reclamation attempts to reduce flows in a manner that will limit the possibility of stranding ESA-listed snail species found downstream of Minidoka and Milner Dams. A maximum reduction rate of 100 cfs per day is currently used. This operation is initiated from an agreement with USFWS, IPC, and Reclamation (and separate ESA consultations) for upper Snake River flow augmentation (attachment A).

#### **4.1.1.5.2 Boise River Releases**

Reclamation typically requests that releases for flow augmentation begin when irrigation storage releases start and continue until all releases have been made. The release rate is relatively low, about 400 cfs above the irrigation release rate, due to Boise River recreation safety concerns and to avoid damage to gravel pushup dams. The Ada County Parks and Waterways considers 1,500 cfs to be the maximum safe riverflow, and irrigation releases are usually about 1,100 cfs. Temporary gravel pushup dams which divert water at flows below 1,250 cfs can be damaged at flows above 1,500 cfs.

#### **4.1.1.5.3 Payette River Releases**

The Payette River Watershed Council meets on a regular basis to discuss a variety of operational issues including flow augmentation. Reclamation participates in these meetings and seeks to develop consensus on a flow release plan. A general strategy has evolved to release some of the water in the summer and some in the winter. Releasing water in the summer benefits white-water recreation, water quality in the lower Payette River, and resident stream fish; releasing water in the winter benefits summer reservoir recreation, reservoir water quality, and resident lake fish at Cascade and Deadwood Reservoirs.

The split has been either 50/50 or 60/40 for summer/winter releases. This release pattern is feasible because IPC (a watershed council participant) drafts Brownlee Reservoir storage to meet summer salmon flows in the lower Snake River. The Payette River winter release generally begins in early to mid-December at a rate of 1,000 cfs to repay IPC for the summer Brownlee release. This strategy is acceptable for power production and creates space in Brownlee Reservoir to better manage flows downstream from Hells Canyon Dam during the fall chinook spawning season which is from mid-October to early December.

Summer releases from the Payette River begin in June or July and are usually made at a rate of about 1,000 cfs above irrigation deliveries until sometime in August. Although this modest rate lengthens the delivery time, it avoids damage to gravel pushup diversion dams and the need to rebuild those diversion structures after the augmentation season.

### **4.1.2 Costs**

Approximately \$5.7 million have been spent in recent years for the purchase of about 60,274 acre-feet of storage space in Reclamation reservoirs and about \$1.3 million has been spent to purchase 17,600 acre-feet of natural flow rights. Reclamation also spends about \$2.5 million annually to purchase rental water. Rental costs in 1997 were \$5.40 per acre-foot for Payette rentals, \$6.50 per acre-foot for Boise rentals, and \$10.50 per acre-foot for upper Snake rentals.

To provide a more reliable water supply, Reclamation needs to continue to make additional permanent acquisitions of storage space and natural flow rights. Total costs are impossible to predict under a willing seller concept because Reclamation's presence within the marketplace and recognition that additional flow augmentation is needed may raise the market value of water.

See Chapter 9 for additional discussion of costs and other implementation concerns.

### **4.1.3 Funding**

Flow augmentation costs have been funded under Reclamation's Columbia-Snake River Salmon Recovery program. These costs are non-reimbursable meaning that the entire cost is funded by the Federal Government. Annual appropriations are obtained through Reclamation's budgeting process and funds are expended as needed.

### **4.1.4 Implementation**

Existing Idaho legislation (I.C. 42-1763B) was enacted in 1995 and expires on January 1, 2000. It covers only releases of water from storage (not natural flows) and specifies that the amount of flow augmentation that Reclamation can provide from all sources is limited to 427,000 acre-feet in any year. It also stipulates that the water released must also be used for power production in Idaho. The legislation, the NMFS 1995 BIOP, and the Reclamation ROD all specify that water must be obtained only from willing participants. The BIOP and ROD further specify that the flow augmentation releases will be made in accordance with state water law. Reclamation considers the current flow augmentation of 427,000 acre-feet to be a permanent program until such time as future decisions and the required Federal, state, and congressional actions change that decision.

Reclamation expects to again approach the IDWR and Idaho Legislature about long-term authority to release the 427,000 acre-feet and to allow the use of natural flows for flow augmentation. Handling a potential renewal of I.C. 42-1763B raises serious concerns as Idaho interests have been very reluctant to authorize any flow augmentation releases. From a practical standpoint, it would be necessary, in 1999, to reinitiate a request for change in use of storage space, an action that triggered passage of I.C. 42-1763B. In 1999, the region will be in the midst of a long-term decision about how much, if any, volume of water to request for flow augmentation.

## **4.2 No Augmentation Scenario**

Under the No Augmentation scenario, Reclamation would provide no water for flow augmentation in the lower Snake River (the situation that existed prior to 1991). Reclamation would halt efforts to permanently acquire water sources, would no longer purchase rental water, and would likely retain all storage currently assigned to flow augmentation. Water that accumulates in the acquired space along with water that accumulates in reassigned uncontracted storage space would be available for operational flexibility in meeting a variety of uses.

## **4.3 1427i Scenario**

The goal of this scenario is to provide up to a maximum of 1,427,000 acre-feet of water to meet deficiencies in target flows at Lower Granite Dam with no firm limits on Reclamation reservoir drawdown to preserve natural resources or recreation opportunities. The water to meet this goal would be obtained by purchase of natural flow rights, which necessarily reduces the acreage of private irrigation, and from Reclamation storage, which would result in shortages to irrigated lands in Reclamation projects. To keep the irrigation shortages to a minimum, reservoir space for flow augmentation would be carefully selected and reservoirs would be drawn down as needed.

### **4.3.1 Water Acquisition**

Acquisition of large amounts of water rights and storage space to meet the goals of the 1427i Scenario are likely to be problematic. These issues are discussed in chapter 9. For this analysis it was simply assumed the water sources discussed in chapter 5 could be acquired.

### **4.3.2 Delivery Plan**

Reclamation would continue to work with the TMT to time the release of water to arrive at the lower Snake River at times that target flows at Lower Granite Dam could not be met by natural flows and releases from Dworshak Reservoir. Reclamation releases would continue through the end of the flow augmentation season or until 1,427,000 acre-feet had been delivered. Brownlee Reservoir could continue to be used to shape about 427,000 acre-feet, but shaping of the additional 1MAF was not assumed. Reclamation releases would continue to meet channel criteria to avoid flooding, but current system agreements to constrain flow augmentation releases (1,500 cfs at Milner, 400 cfs at Boise, and 1,000 cfs at Payette) could not be followed and still deliver the entire flow augmentation during the augmentation period. In fact, delivery of the 1,427,000 acre-feet during the flow augmentation season would cause stream segments to approach flood stage during much of the augmentation season.

## **4.4 1427r Scenario**

The goal of this scenario is to provide up to a maximum of 1,427,000 acre-feet of water to meet deficiencies in target flows at Lower Granite Dam while attempting to limit the drawdown of Reclamation reservoirs to current levels (Base Case scenario). The water to meet this goal would be obtained by purchase of natural flow rights, which would necessarily reduce the acreage of private irrigation, and from Reclamation storage which would result in shortages to irrigated lands in Reclamation projects. To limit the drawdown of Reclamation reservoirs, shortages to irrigated lands would be increased.

#### **4.4.1 Water Acquisition**

Acquisition of large amounts of water rights and storage space to meet the goals of the 1427r Scenario are likely to be problematic. These issues are discussed in the Implementation chapter. For this analysis it was simply assumed the water sources discussed in chapter 5 could be acquired.

#### **4.4.2 Delivery Plan**

Reclamation would continue to work with the TMT to time the release of water to arrive at the Lower Snake River at the time that target flows at Lower Granite Dam could not be met by natural flows and releases from Dworshak Reservoir. Reclamation releases would continue through the end of the flow augmentation season or until the 1,427,000 acre-feet had been delivered. Brownlee Reservoir could continue to be used to shape about 427,000 acre-feet, but shaping of the additional 1MAF was not assumed. Reclamation releases would continue to meet channel criteria to avoid flooding, but current system constraints on flow augmentation releases (1,500 cfs at Milner, 400 cfs at Boise, and 1,000 cfs at Payette) could not be followed and still deliver the entire flow augmentation during the augmentation period. In fact, delivery of the 1,427,000 acre-feet during the flow augmentation season would cause stream segments to approach flood stage during much of the augmentation season.